TRIUMF

Biennial Scientific Report 2013—2015

TRIUMF

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CREATING SOCIAL AND ECONOMIC IMPACT

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5.1 INTRODUCTION

One of TRIUMF's key missions is to leverage scientific discovery for the benefit of all Canadians by transferring knowledge training personnel and commercializing research to maximize our socioeconomic impact.

TRIUMF's highly specialized staff drive the research done at the lab, and their expertise is an invaluable resource for students and researchers at TRIUMF as well as at our partner institutions across the country.

TRIUMF's nineteen Canadian member universities provide a strong network that encourages education, innovation, and collaboration.

Industrial partners bolster this network with business expertise that complements the work of researchers at TRIUMF and across Canada. Advanced Applied Physics Solutions (AAPS), Inc., TRIUMF's commercialization arm, provides the ideal platform to transform research into products, solutions and services. Together, what emerges is a national commitment to creating socioeconomic impact benefitting all Canadians.

5.2 TRAINING THE NEXT GENERATION OF LEADERS

C. RODRIGO

As a hub for world-class research, TRIUMF is fortunate to host many brilliant young researchers who are developing their passion for science. Through various initiatives that target these exceptional individuals, TRIUMF trains and fosters the next generation of scientists.

5.2.1 TRISEP

The TRI-Institute Summer School for Particle Physics (TRISEP) is a unique summer school for international graduate students and young researchers that is operated in cooperation with the Perimeter Institute, SNOLAB and TRIUMF. The school offers attendees the opportunity to interact with experts through lectures, Q&A sessions, and discussions with featured speakers (see Figure 1). In July 2013 over 40 students attended the inaugural summer school at TRIUMF, while the 2014 and 2015 sessions were held at SNOLAB and the Perimeter Institute, respectively.

Future TRISEP sessions will continue to rotate among the three institutions each year.

5.2.2 IsoSiM

Isotopes for Science and Medicine (IsoSiM) is an NSERC "Create" program that began in April 2014. Jointly operated by UBC and TRIUMF, IsoSiM is designed to give students the skills required to succeed in isotope-related fields of study and work. Students are given individualized professional development plans tailored to their personal goals. The program is unique as it emphasizes diversification and professional development by exposing students to applications for isotopes in areas outside their respective fields of study. Workshops allow them to hone their professional skills, and projects at facilities like TRIUMF give them first-hand experience with real-world scientific research. TRIUMF welcomed the first cohort of six students in September 2014. By June 2015 the program had gained another six students.

Figure 1. The TRI-Institute Summer School

Figure 2. Andrew Robertson, IsoSIM program student

5.3 CONNECTING SCIENCE TO SOCIETY

M.M. PAVAN

TRIUMF's public tours continue to be a major draw for visitors, young and old, scientists and science enthusiasts alike. From June 2013–March 2015, close to 8,000 guests visited the lab on over 1,100 tours. In September 2013, TRIUMF hosted an open house and invited its community friends behind the fence for a closer look at TRIUMF's research and discovery. Gusty winds and torrential rain weren't enough to discourage over 1,200 visitors from being greeted and entertained by a team of 130 researchers, post-docs, technicians, students, and staff (see Figure 2).

TRIUMF connects to the community through various local festivals and large-scale events.

Members of the lab represent TRIUMF at annual events such as the UNA Barn Raising, UBC Alumni Weekend, and the Wesbrook Village Festival, as well as local events, such as the Richmond Public Library Science and Technology Forum. Topics covered at these events include antimatter, radiation and Fukushima, particle physics, and proton therapy. For example, on April 2013 Dr. Anadi Canepa delivered a speech about her work on the ATLAS experiment at CERN to 500 attendees at Sam Sullivan's Public Salon, a Vancouver event promoting discussion of public policy ideas. TRIUMF also sponsored two films at local film festivals; "Particle Fever" at the Vancouver International Film Festival, and "The Circle" at DOXA Film Festival, with staff scientists participating in post-viewing Q&A sessions.

Through the ongoing Partners in Innovation relationship with Science World B.C., TRIUMF continues to offer the "Unveiling the Universe" lectures, which connected high-profile international scientists with the general public. Highlights of the 2013–2015 biennium included Dr. Hitoshi Murayama on "Mysteries of the Quantum Universe," Dr. Paul Schaffer on "Medicine

Figure 2. TRIUMF Open House in September 2013

Figure 3. "Unveiling the Universe" lectures at Science World

Accelerated," Dr. Rocky Kolb's "From the Quantum to the Cosmos," and Dr. Makoto Fujiwara's "What's the matter with Antimatter?" Approximately 1,200 guests participated in these lectures. In addition to the 400-seat Omnimax Theatre at the Telus World of Science in Vancouver, and interested viewers can now participate via a live webcast (see Figure 3).

In June 2013, invited members of the Vancouver entrepreneur and high-technology community gathered at TRIUMF for its inaugural Science & Technology Gala. The event served a dual purpose: first, to quench the "where do we come from" curiosity of the guests; and second, to appeal to their technical side with an introduction to advanced particle-accelerator technologies.

In September 2014, TRIUMF and AAPS welcomed Canadian leaders in knowledge mobilization and technology transfer to its annual "Innovations and Industrial Partnerships Workshop." This workshop engaged colleagues from TRIUMF's member universities and other partners in a forum to discuss innovation practices and explore opportunities for leveraging research to create positive social and economic impacts on Canadian society. Through conduits like TRIUMF, researchers and industrial partners harness their combined expertise to face common challenges in areas of knowledge translation and innovation.

5.4. INDUSTRIAL PARTNERSHIPS AND COMMERCIALIZATION

J. HANLON

AAPS' close partnership with TRIUMF provides access to knowledge and expertise their industrial partners to make use of this expertise and specialized infrastructure that TRIUMF offers. This further connects science to society and creates social and economic impacts for Canada.

5.4.1 Irradiation Services

It is possible to simulate natural-radiation exposures, either in space or terrestrial environments by using the low-intensity energetic proton and neutron beams available at TRIUMF. An upgrade to the 1B beamline in 2015, facilitated by AAPS and financed by Cisco Systems, allows for higher intensities of neutrons and greater access by users. Even at low intensity, electronics that experience a few minutes of exposure in these beams are submitted to radiation corresponding to years of operation in space, at high altitudes, or on the ground. Over 35 companies from Canada, US, and Europe have made commercial use of the irradiation facilities.

5.4.2 Isotope Production

TRIUMF's expertise in cyclotron operations, target engineering, and radiopharmaceutical production realizes extraordinary benefits for B. C. and Canada as a whole. The nuclear medicine team has mastery of the chemistry and facilities needed to isolate, purify, and combine the isotopes with biologically active target molecules enabling a world-class program that includes molecular imaging of neurodegenerative disease and cancer. In the 2013–2015 time frame, with funding from NRCAN, TRIUMF led a team that successfully demonstrated an accelerator-based solution capable of producing one of the most important and prevalently used isotopes in healthcare, Technetium-99m, eliminating the need for its production using highly enriched uranium at nuclear reactors.

5.4.3 Technical Consulting

TRIUMF's capabilities in physics, engineering, and technical design are often tapped in the form of short-term consulting arrangements. The responsible use of public funds by TRIUMF for its programs requires the laboratory to limit its "contract research" or "work for others" activities to those that directly advance its mission. TRIUMF staff might contribute to troubleshooting a private company's product line or providing advice for high-tech infrastructure development. TRIUMF's contributions to the success of AAPS initiatives fall into this category.

As TRIUMF's innovation and commercialization partner, AAPS leverages TRIUMF's know-how and expertise

to provide solutions to industry and academic institutions. In focusing on priority areas, like natural resources (mining exploration), healthcare (medical isotopes), safety and security (radiation detection and monitoring) and accelerator-driven technologies, these business lines are expected to grow and produce even more economic and social benefits to Canadians.

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